Low Cost Guided Munition

System Study Presentation

to

34th Gun & Ammunition Symposium

27 April 1999

Dr Paul Reip - DERA

Team LCGM

- **Thomson Thorn Missile Electronics**
- **British Aerospace - Royal Ordnance**
- **Matra BAe Dynamics**
- **Hunting Engineering**
- **Defence Evaluation and Research Agency**

Military Requirement

- **More Effective Payloads**
- **Increased Range Capability**

  (Army - 60 km, Navy - 150 km)
- **Improved Precision**

Objectives

- **1 year system study (Land and Navy applications)**
- **Examine how new technologies can improve performance or reduce cost**
- **Examine the maturity of the technologies**
- **Identify and quantify risks**

Equipment compatibility

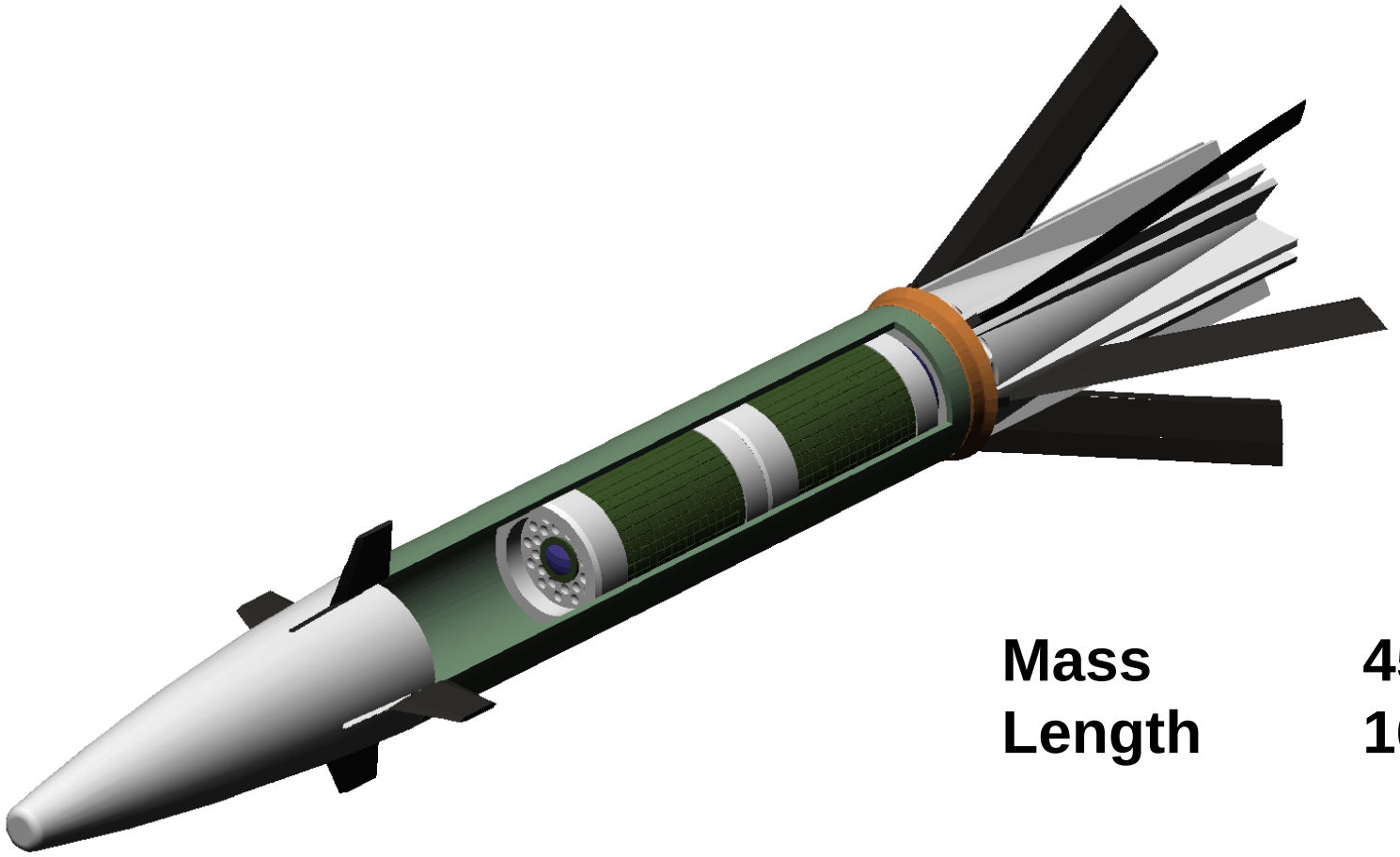
- **155 mm equipments (AS90 + ERO)**
- **Modular charge system**

- **Internal ballistics:- nominal 945 m/s at 350 MPa for a 45 kg shot**

Technologies

- **Composite materials**
- **Gun hardened GPS**
- **MEMS IMU and associated sensors**
- **Gun hardened canard control and electronics**
- **Slipping obturator for rifled barrels**

The Concept “A”



Mass	**45 kg**
Length	**1620 mm**

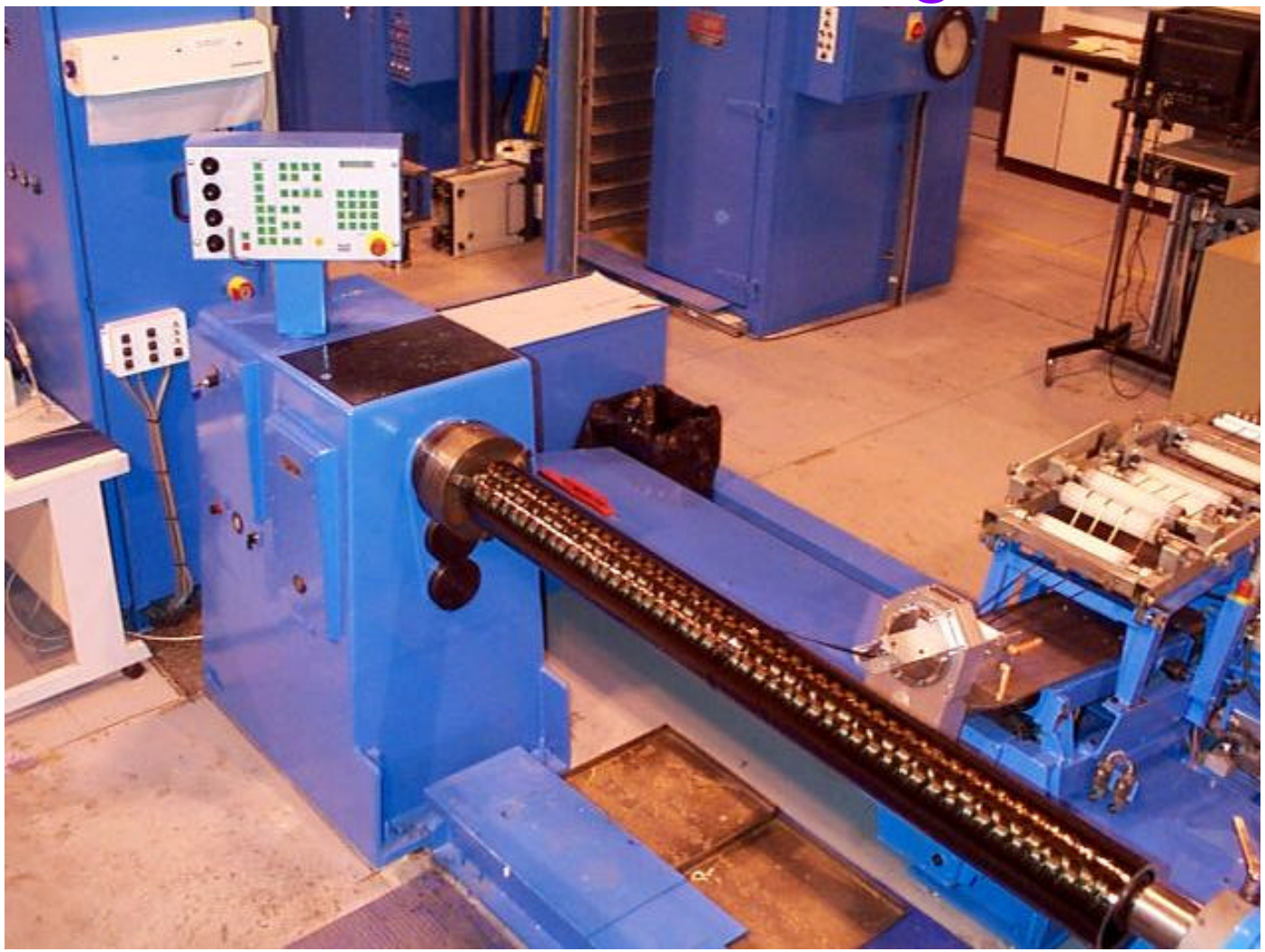
Mass Breakdown

Nose structure	2.3 kg
Guidance & control	1.9 kg
Body	4.7 kg
Fin unit	4.0 kg
Payload	32.0 kg
Efficiency	67%

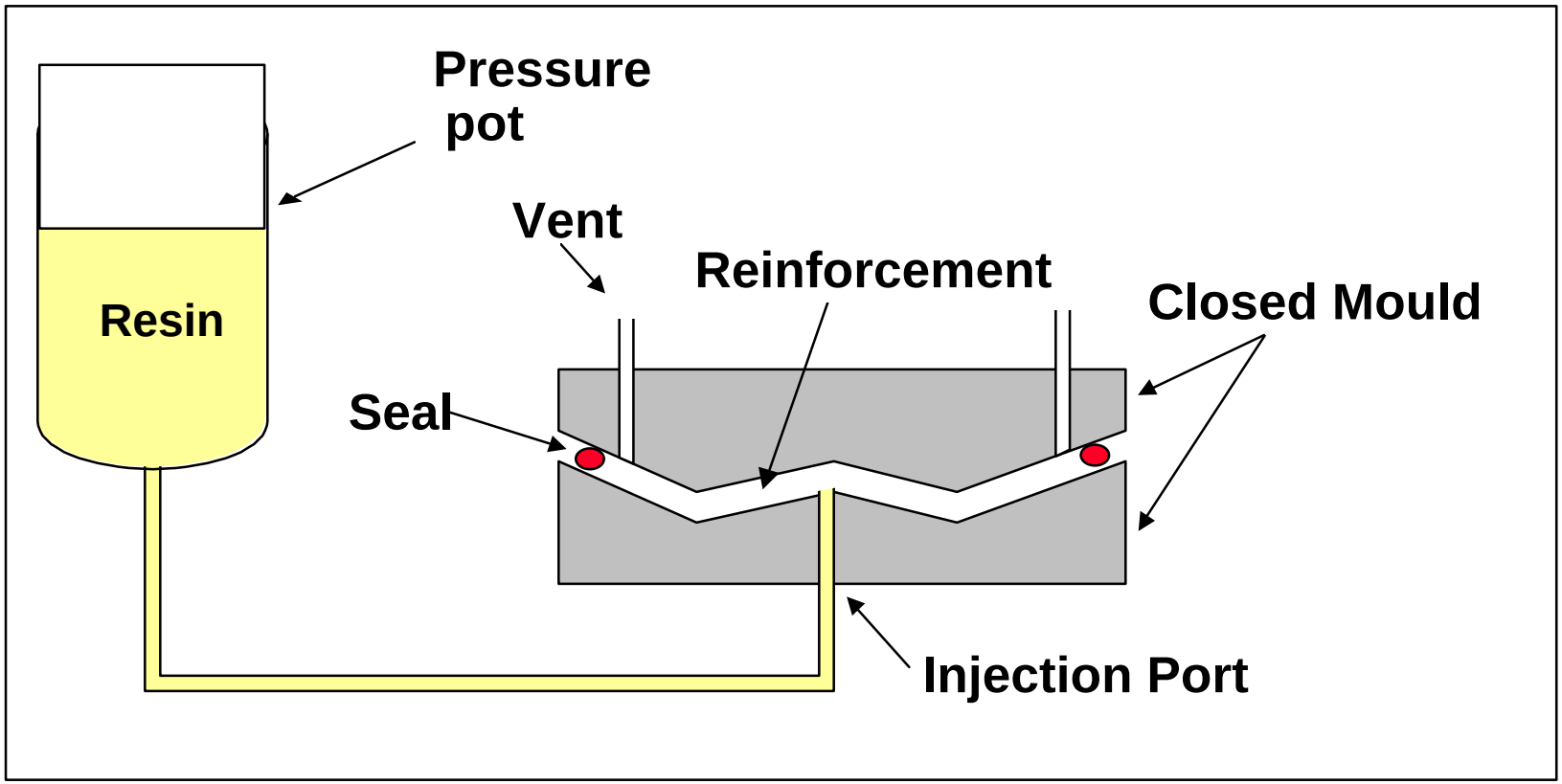
Composite Components

- **Carrier body** - **Filament winding**
- **Fin blades** - **Resin transfer**
- **Fin unit** - **Compression moulding**
- **Nose cone** - **Compression moulding**
- **Payload support** - **Pultrusion**

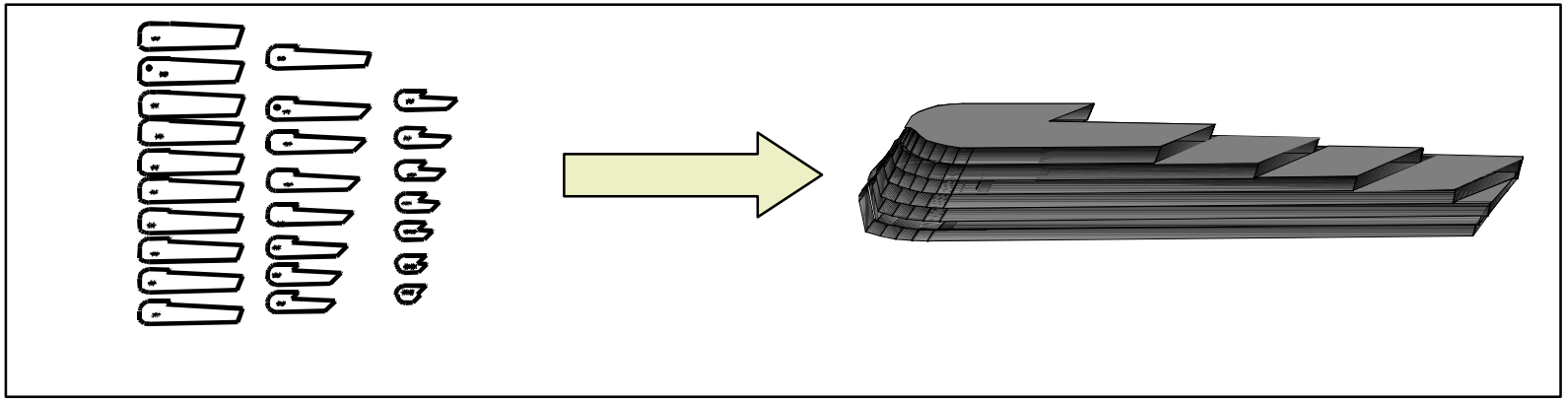
Filament Winding



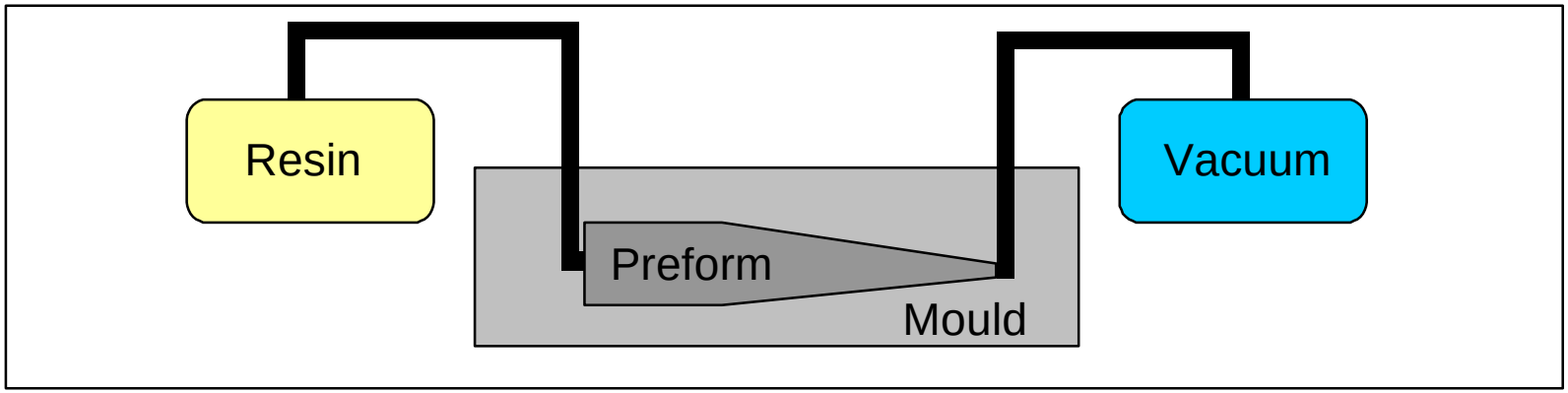
The Resin Transfer Moulding Process



Fin Manufacture

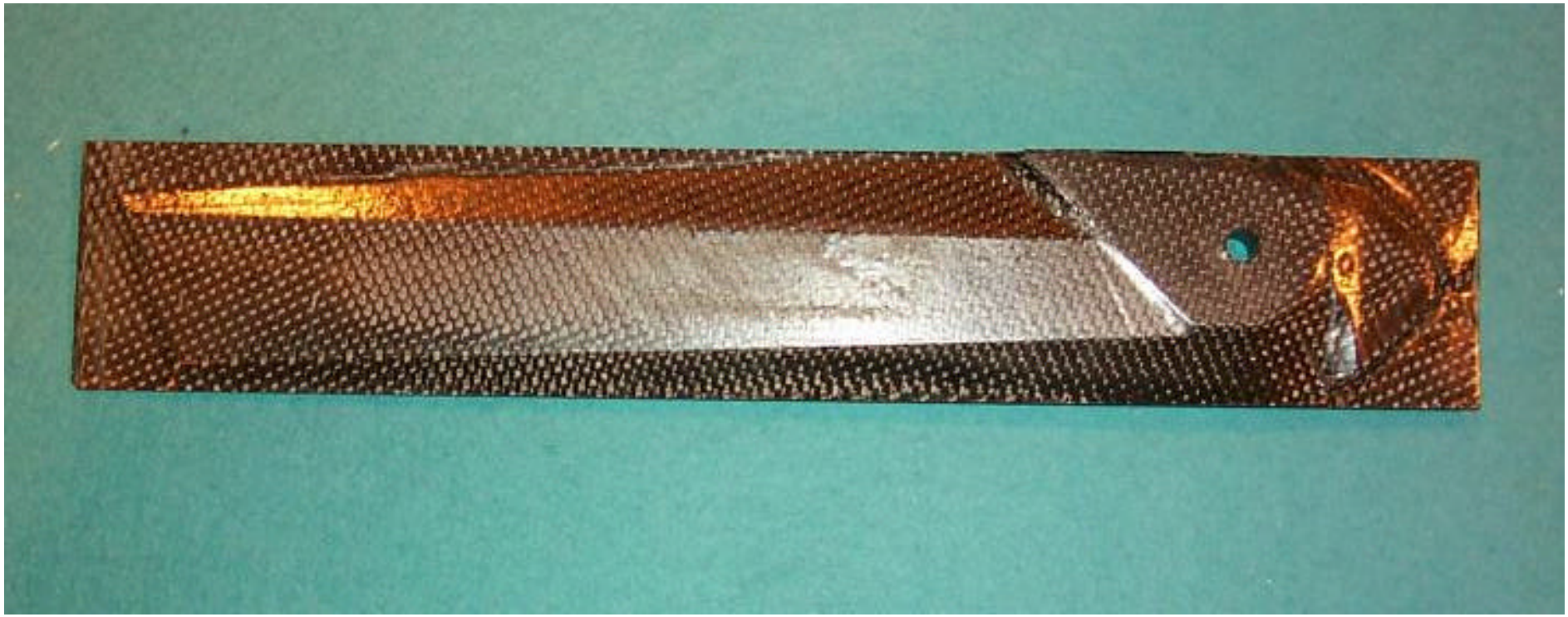


Pre-forming

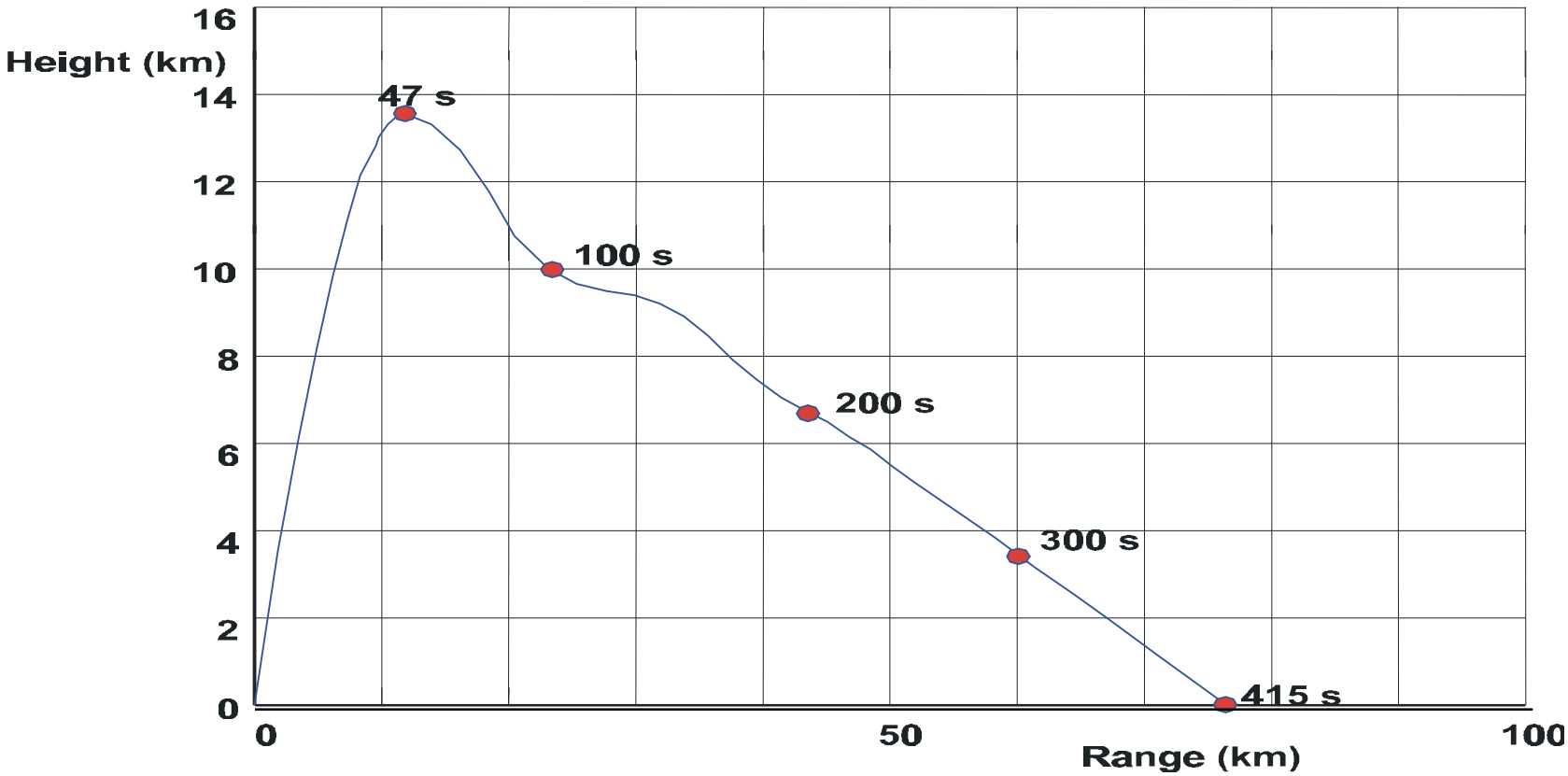


Infusion

Fin made by RTM



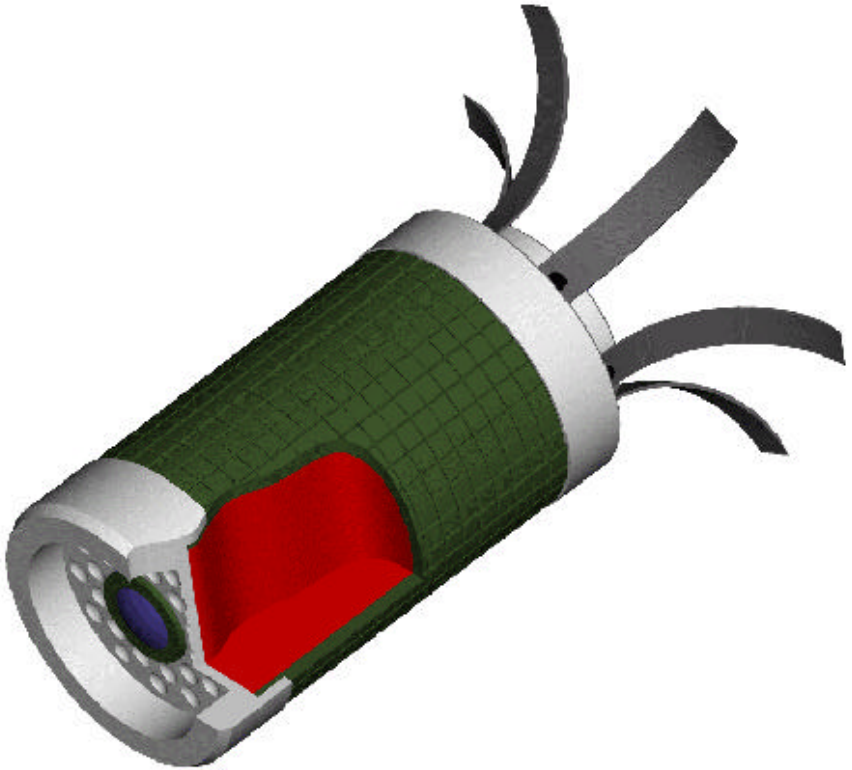
Glide Trajectory



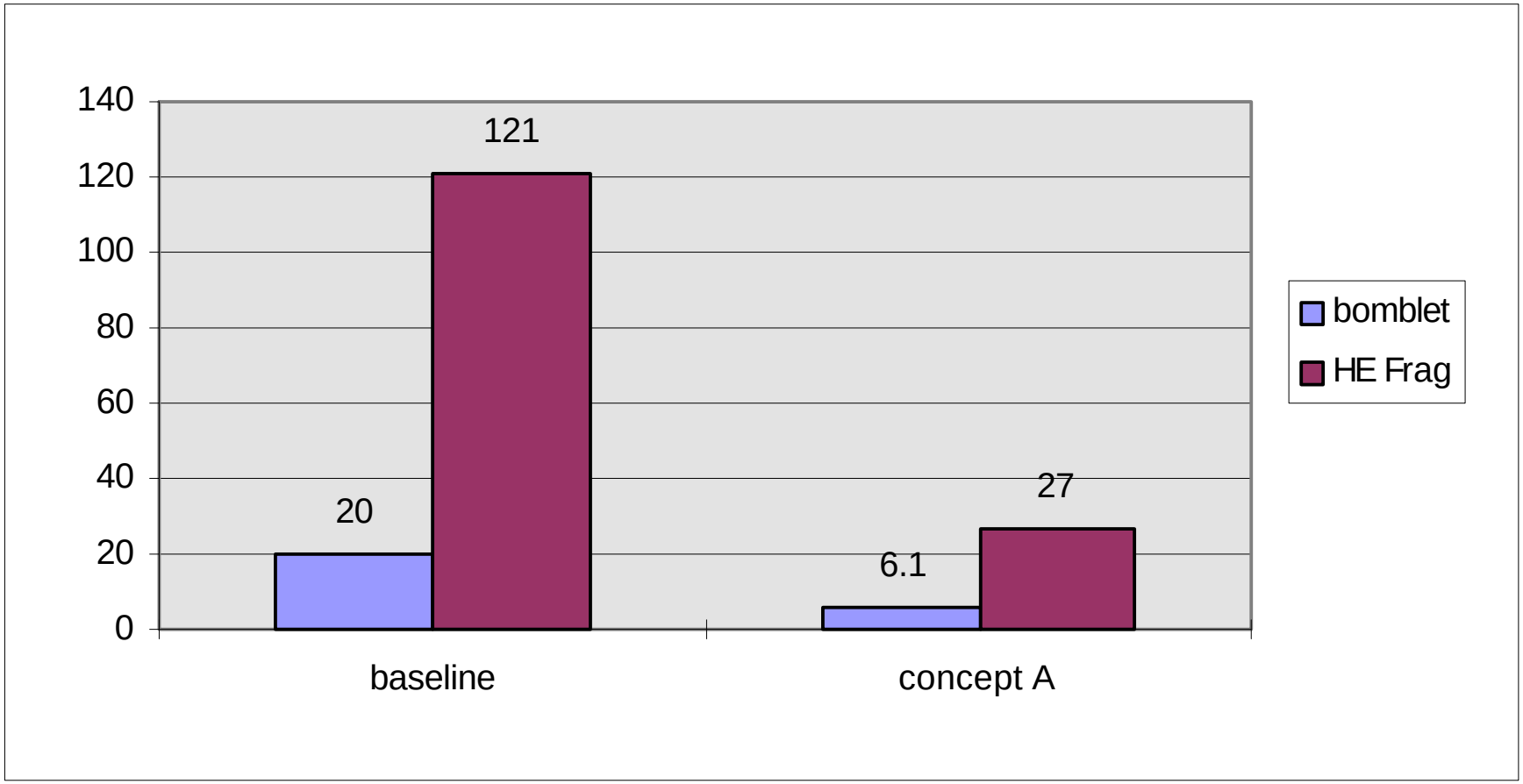
Lethal Mechanisms

- **Bomblets**
- **Sensor-fuzed sub-munitions**
- **Deployable Fragmenting sub-Munitions**

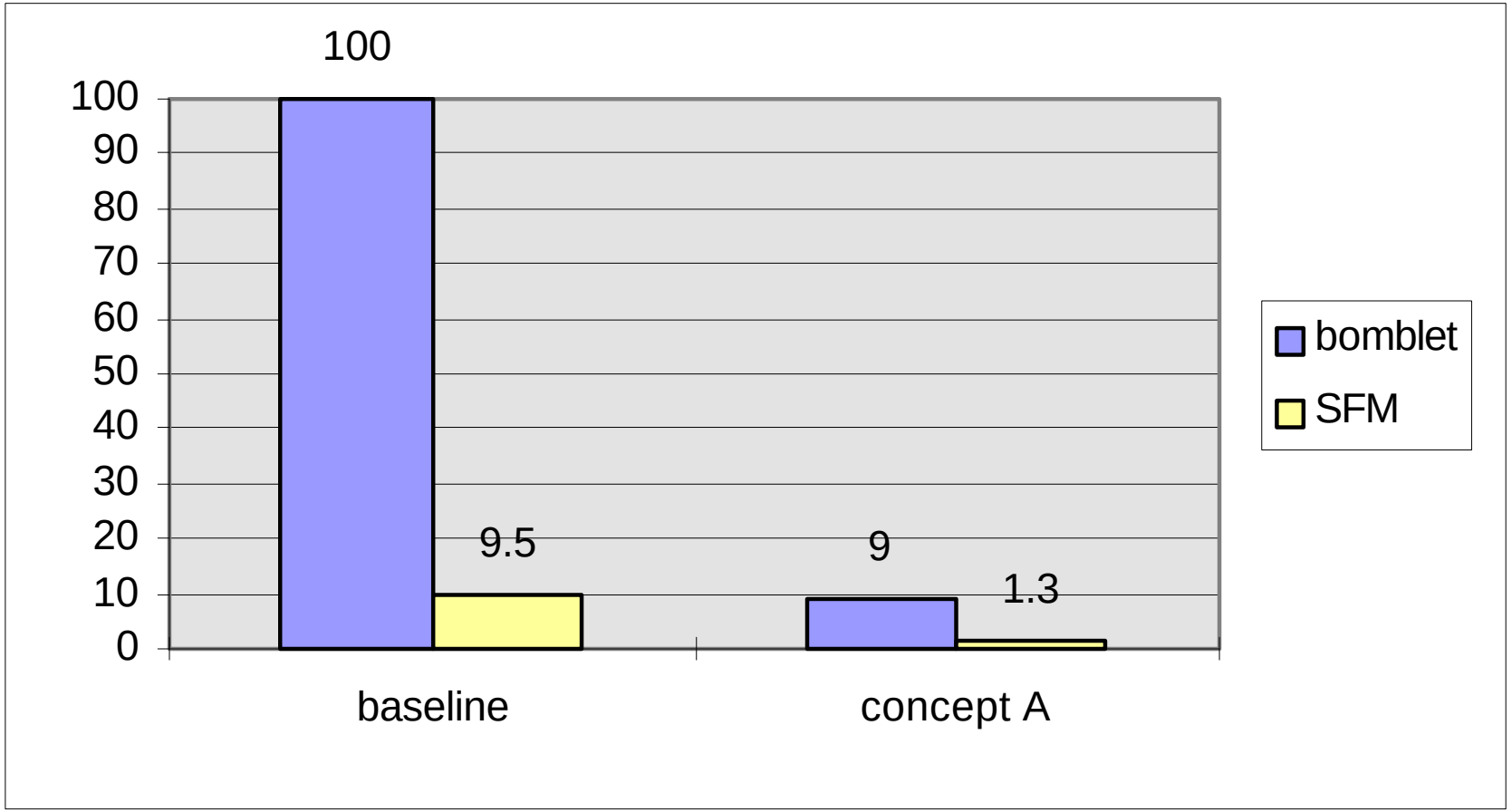
Unitary Deployable Fragmenting sub-munition



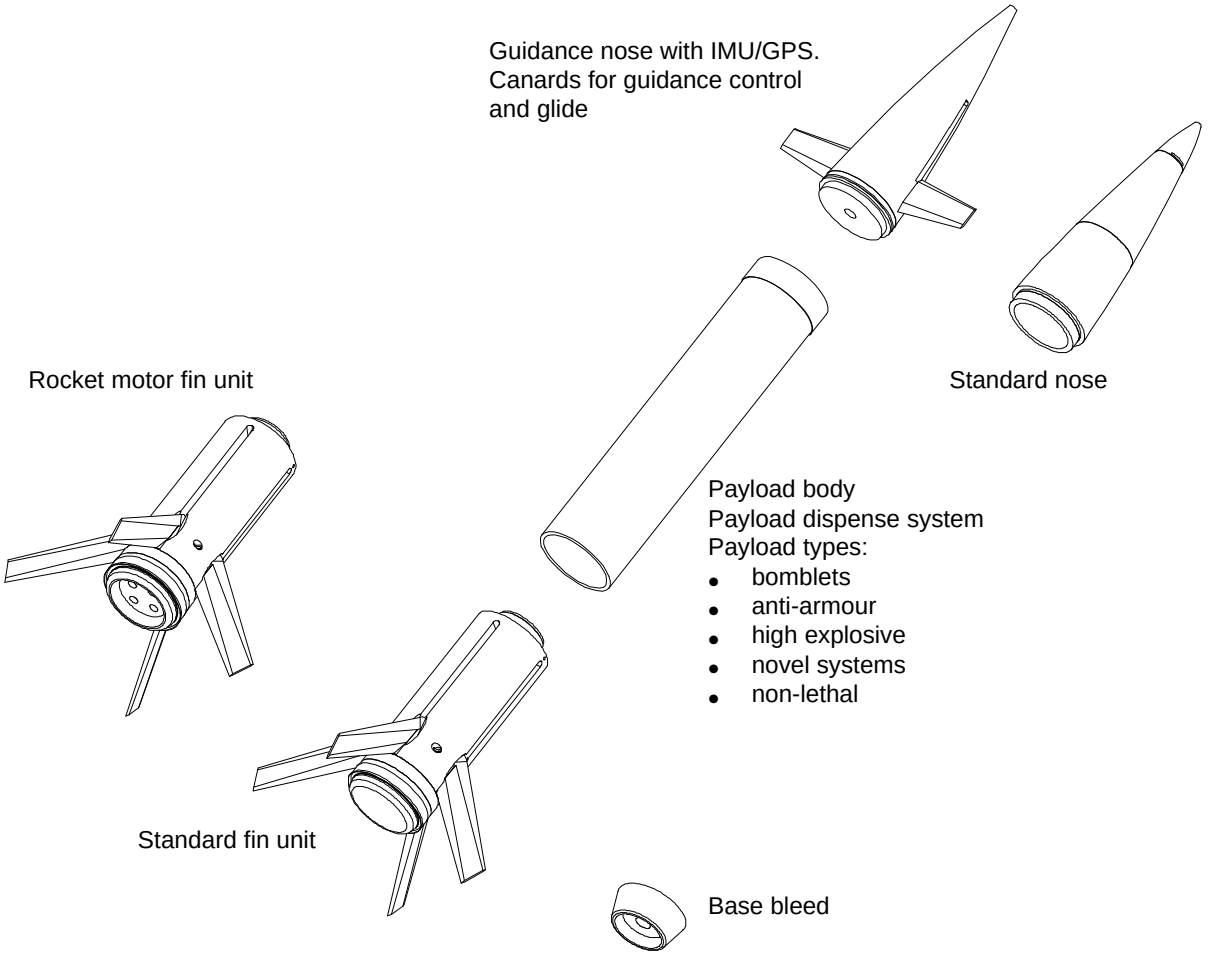
Effectiveness comparisons (Troops)



Effectiveness comparisons (SP battery)



Modularity Concepts



Conclusions (1)

- **LCGM can achieve 60 km operational range carrying an effective payload**
- **LCGM can be fired from future & in-service 155 mm gun systems (and is adaptable for other calibres)**
- **Technologies for LCGM likely to be available and affordable in the timescale**

Conclusions (2)

- **Extended range potential**
  (Navy requirement needs propulsion)
- **System modularity supports technology upgrades**
- **Payload family is effective against the specified target set**
- **Cost effective at previously unattainable ranges**